

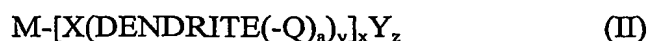
CLAIMS

1. A charge-neutral organometallic dendrimer of formula (I):



- 5 in which CORE represents a group of formula MX_xY_z , in which M represents a metal cation, x represents an integer of 1 or more, each X which may be the same or different represents a mono-, bi- or tri-dentate coordinating group, z represents 0 or an integer of 1 or more, and each Y which may be the same or different represents a coordinating group, the total of $(b.x) + (c.z)$ being equal to the number of
 10 coordination sites on M, wherein b is the number of coordination sites on X and c is the number of coordination sites on Y; n represents an integer of 2 or more; each DENDRITE which may be the same or different represents a dendritic molecular structure bonded to a group X; a represents 0 or an integer of 1 or more; and each Q which may be the same or different represents a surface group; CORE terminating in
 15 the first single bond which is connected to a branching group or branching atom of DENDRITE; which dendrimer has a structure in which no hemisphere of a notional sphere centred on M and containing the dendrimer is devoid of a said first single bond.

2. An organometallic dendrimer according to claim 1 which is of
 20 formula (II):



in which x represents an integer of 2 or more, y represents an integer of 2 or more, and the other symbols are as defined in claim 1.

3. An organometallic dendrimer according to claim 2 wherein x is 3 and
 25 z is 0.
4. An organometallic dendrimer according to any one of claims 1 to 3 that contains one inherently at least partially conjugated dendron.
5. An organometallic dendrimer according to any one of claims 1 to 3 that contains two inherently at least partially conjugated dendrons.
- 30 6. An organometallic dendrimer according to any one of claims 1 to 3

-27-

that contains at least three inherently at least partially conjugated dendrons.

7. An organometallic dendrimer according to any one of claims 1 to 3 that contains all at least inherently partially conjugated dendrons.

8. An organometallic dendrimer according to any one of claims 1 to 7
5 that is luminescent in the solid state.

9. An organometallic dendrimer according to claim 8 that is fluorescent in the solid state.

10. An organometallic dendrimer according to claim 8 that is phosphorescent in the solid state.

10 11. An organometallic dendrimer according to claim 10 that emits from a metal to ligand charge transfer state.

12. An organometallic dendrimer according to any one of the preceding claims wherein each DENDRITE represents an inherently at least partially conjugated dendritic molecular structure comprising aryl and/or heteroaryl groups or
15 nitrogen and, optionally, vinyl or acetylenyl groups connected via sp^2 or sp hybridised carbon atoms of said (hetero)aryl, vinyl and acetylenyl groups or via single bonds between N and (hetero)aryl groups, CORE terminating in the first single bond which is connected to an sp^2 hybridised (ring) carbon atom of the first (hetero)aryl group or nitrogen to which more than one at least partially conjugated
20 dendritic branch is attached, said ring carbon atom or N forming part of said DENDRITE.

13. An organometallic dendrimer according to any one of the preceding claims wherein at least one DENDRITE represents a dendritic molecular structure comprising at least one nitrogen atom which forms part of an aromatic ring system or
25 is directly bonded to at least two aromatic groups, CORE terminating in the single bond to the first nitrogen atom or aromatic ring to which more than one dendritic chain is attached, said nitrogen atom or ring forming part of said DENDRITE.

14. An organometallic dendrimer according to any one of the preceding claims wherein at least one Q is a surface group selected from a further-reactable
30 alkene, (meth)acrylate, sulphur-containing, or silicon-containing group; a sulphonyl

-28-

group; a polyether group; C₁-to-C₁₅ alkyl group; an amine group; a mono-, di- or tri-C₁-to-C₁₅ alkyl amine group; a -COOR group wherein R is hydrogen or C₁-to-C₁₅ alkyl; an -OR group wherein R is hydrogen, aryl, or C₁-to-C₁₅ alkyl or alkenyl; an -O₂SR group wherein R is C₁-to-C₁₅ alkyl or alkenyl; an -SR group wherein R is aryl, or C₁-to-C₁₅ alkyl or alkenyl; and an -SiR₃ group wherein the R groups are the same or different and are hydrogen, C₁-to-C₁₅ alkyl or alkenyl, or -SR' group (R' is aryl or C₁-to-C₁₅ alkyl or alkenyl), aryl, or heteroaryl.

15. An organometallic dendrimer according to any one of the preceding claims wherein the surface groups are such as to allow solution processing.

10 16. An organometallic dendrimer according to any one of the preceding claims wherein the surface groups are such as to allow patterning.

17. An organometallic dendrimer according to any one of claims 1 to 16 wherein the metal cation is iridium.

15 18. An organometallic dendrimer according to any one of claims 1 to 16 wherein the metal cation is rhenium.

19. An organometallic dendrimer according to any one of claims 1 to 16 wherein the metal cation is platinum.

20. An organometallic dendrimer according to any one of the preceding claims wherein at least one DENDRITE is attached to a coordinating group X that is bonded to M via at least one metal-carbon bond.

21. A film consisting essentially of an organometallic dendrimer according to any one of claims 1 to 20.

22. A film comprising an organometallic dendrimer according to any one of claims 1 to 19 and one or more molecular, dendritic or polymeric compounds.

25 23. A film according to claim 22 wherein the molar ratio of the organometallic dendrimer to the other component or components is from 1:1 to 100:1.

24. An organic light-emitting device comprising, in sequence, layers of an optional substrate, an electrode, a first optional charge-transporting layer, a light-emissive layer, a second optional charge-transporting layer and a counter electrode,

30

-29-

wherein at least one of the light-emissive layer, first optional charge-transporting layer and second optional charge-transporting layers is a film comprising an organometallic dendrimer according to any one of claims 1 to 20 or a film according to any one of claims 21 to 23.

5 25. A device according to claim 24 wherein the light-emissive layer is a film comprising an organometallic dendrimer according to any one of claims 1 to 20 or a film according to any one of claims 21 to 23.

 26. A device according to claim 24 or 25 which comprises at least one charge-transporting layer.

10 27. A device according to any one of claims 24 to 26 wherein the light-emissive layer comprises an emissive dopant, as additional component.

 28. A device according to any one of claims 24 to 27 wherein the light-emissive layer comprises one or more charge-transporting species, as additional component.

15 29. A device according to any one of claims 24 to 28 wherein the light-emissive layer comprises a molecular or dendritic species, as additional component.

 30. A device according to any one of claims 24 to 29 wherein the light-emissive layer comprises a polymer, as additional component.

20 31. A device according to any one of claims 24 to 30 wherein the additional component represents 95 to 5 mol% of the total composition.

 32. A device according to any one of claims 24 to 31 that is an organic light-emitting diode (OLED).

 33. A photovoltaic device that comprises at least a layer of a film
25 comprising an organometallic dendrimer according to any one of claims 1 to 20 or a film according to any one of claims 21 to 23.

 34. An organometallic dendrimer according to claim 1 substantially as hereinbefore described.

 35. A film according to claim 21 or 22 substantially as hereinbefore
30 described.

-30-

36. An organic light-emitting device according to claim 24 substantially as hereinbefore described.

37. A photovoltaic device according to claim 33 substantially as hereinbefore described.